

①

|   | $A_T$  | $\Sigma A_T$ | $R_1$ | $D$ | $L$ | $P_D$ | $P_L$ | $P_U$ | $\Sigma P_U$ |
|---|--------|--------------|-------|-----|-----|-------|-------|-------|--------------|
| 2 | 900 SF | 900          | 1.0   | 100 | 12  | 90 k  | 11 k  | 106   | 106          |
| 4 | 900 SF | 1800         | 1.0   | 120 | 40  | 108 k | 36 k  | 187   | 313          |
| 3 | 900 SF | 2700         | 1.0   | 120 | 40  | 108 k | 36 k  | 187   | 500          |
| 2 | 900 SF | 3600         | 1.0   | 120 | 40  | 108 k | 36 k  | 187   | 687          |

$$P_U = 687 \text{ k} \quad KL = 1.0 \times 14 \text{ FT} = 14 \text{ FT}$$

$$W10 \times 77 \text{ @ } KL = 14 \quad \phi P_n = 753 \text{ k}$$

$$DCR = 687 / 753 = 0.91 \quad \checkmark$$

② +1W  $P_U = 500 \text{ k}$  (SINCE NO MORE 2ND FLOOR)

$$KL = 28 \text{ FT} \quad \phi P_n \text{ OF } W10 \times 77 = 307 \text{ k N.G.}$$

DETERMINE  $\phi F_{CR}$ . NEED  $KL/r$

$$r = \sqrt{I/A}$$

$$I = I_{wx} + I_{rx}$$

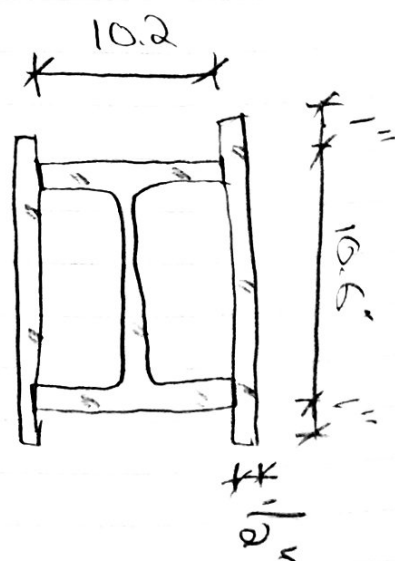
$$I_y = 154 \text{ in}^4 + I_{rx}$$

$$I_{rx} = \frac{b(d^3 - d_1^3)}{12} = \frac{12.6''(11.2^3 - 10.2^3)}{12}$$

$$I_{rx} = 360$$

$$I_y = 154 + 360 = 515 \text{ in}^4 \quad \leftarrow \text{GOVERNS}$$

$$I_x = 455 \text{ in}^4 + 2 \times \frac{1}{2} (12.6)^3 / 12 = 622 \text{ in}^4$$



$$I_x = 622 \quad I_y = 515 \quad A = 22.7 \text{ in}^2 + 2 \times \frac{1}{2} (2.6) = \underline{35.3 \text{ in}^2}$$

$$r_{\min} = \sqrt{515/35} = 3.8 \text{ in}$$

$$KL/r = 1.0 \times 28 \text{ FT} \times 12 \text{ in/FT} / 3.8 = 88$$

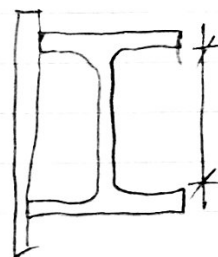
$$\phi F_{cr} = 25.5 \text{ ksi}$$

$$\phi P_n = 25.5 \text{ ksi} \times 35.3 \text{ in}^2 = \underline{905 \text{ k}}$$

$$DCR = 500/905 = \underline{0.55} \quad \checkmark$$

CHECK  $b/t$  OF PL (W10X77 IS NON-SLENDER)

$$b/t = (10.6 - \underset{\substack{\uparrow \\ \text{SUBTRACT} \\ \text{FLANGE } t.}}{2.7/8}) / 1/2$$



$$b/t = 17.7$$

$$\lambda_r = 1.49 \sqrt{E/F_y} = 36 \quad \checkmark$$

RETROFIT IS OKAY.